REMARKS

The Examiner has rejected claims 1-3, 11-14, 25-27 and 55-57 under 35 U.S.C. § 102(b) as being anticipated by Sagnes U.S. Patent No. 5,998,289. Claims 5, 8 and 54 are rejected under § 103(a) as being unpatentable over Sagnes in view of Uejima

Independent claim 1 is amended herein to recite that the variable composition Si_xGe_{1-x} layer has a variable Si:Ge ratio. Claims 2-29 and 54-57 are not amended in this response and appear as original or previously presented. New claims 58-71 are added herein and are directed to the elected Species 1. New independent claim 58 is similar to claim 1 but recites that a continuous Si_xGe_{1-x} layer is deposited over the dielectric layer so as to have a graded Ge content over at least a portion of the thickness thereof. Support for new claim 58 may be found in FIG. 5, where the SiGe layer 520 is depicted as a continuous layer with graded Ge content 521. New claim 65 is similar to claim 1 but recites that the deposited layer consists of Si and Ge, and has the formula Si_xGe_{1-x}. Dependent claims 59-64 depend from claim 58, and dependent claims 66-71 depend from claim 65, and these dependent claims are consistent with the respective dependent claims that depend from claim 1. The addition of these new claims does not require a new prior art search and should therefore be entered. It is further asserted that new claims 58-71 are not taught by the prior art of record.

With respect to the rejection of Claim 1 under 35 U.S.C. § 102(b) over Sagnes, Applicants respectfully traverse. Sagnes does not disclose depositing a Si_xGe_{1-x} layer over the dielectric layer so as to have a variable Si to Ge ratio over at least a portion of the thickness

thereof. As explained in col. 5, line 28 to col. 6, line 33, Sagnes describes a method by which a Si_xGe_{1-x} layer, where x=0.55, is deposited on a silicon oxide layer in a single-wafer reactor. The value of *x* is not variable during the deposition process. This method of deposition allows the nucleation of the SiGe layer on the silicon oxide layer to be controlled such that a polycrystalline SiGe layer is formed having uniform thickness and uniform germanium content. (Col. 6, lines 34-40). As explained in col. 6, lines 41-50, the possibility of deposited layers being non-continuous and non-uniform is a disadvantage of depositing SiGe layers in a multi-wafer furnace caused by long deposition times required for such deposition. Further, Sagnes discloses that in high Ge content layers, the poly-depletion effect may cause the undesirable result of non-uniform composition due to Ge diffusion at the interface. The present invention reduces poly-depletion by depositing the SiGe layer with a variable Si:Ge ratio. The method described by Sagnes is also directed to overcoming these disadvantages in a different way that produces SiGe layers having uniform thickness and uniform germanium concentration. Thus, Sagnes does not disclose a method for depositing a Si_xGe_{1-x} layer so as to purposefully provide a variable Si:Ge ratio over at least a portion of the thickness thereof, as claimed herein.

Furthermore, col. 7, lines 37-46 of Sagnes discloses two layers of SiGe having different/variable compositions by virtue of the first layer being undoped and the second layer being doped with boron or phosphorus. More specifically, to avoid diffusion of the dopants into the silicon oxide layer, Sagnes discloses first depositing a non-doped SiGe layer to a thickness sufficient to protect the silicon oxide layer. Once the non-doped SiGe deposition is complete, the

gaseous dopant is added to the silicon and germanium gas mixture in order to deposit the doped SiGe layer. Thus, the variation in the composition of the doped SiGe layer is a function of the presence of the dopant gas during deposition. However, the ratio of Si to Ge in the formula Si_xGe_{1-x} does not vary over the thickness of the two layers. Rather, the dopant is implanted into the layer. Because the Si:Ge ratio does not vary, the reference cannot anticipate claim 1, as amended herein. Therefore, Applicants respectfully request that the rejection of claim 1 and its dependent claims 2-3, 11-14, 25-27, and 55 under § 102(b) over Sagnes be withdrawn.

With respect to the rejection of Claims 56 and 57 under § 102(b) over Sagnes, Applicants respectfully traverse for at least the same reasons provided with respect to the rejection of claims 1 and 12 over Sagnes. Applicants assume that on page 3 of the Office Action mailed on April 6, 2006, the Examiner meant to state that Sagnes rather than Uejima et al. implicitly discloses the language of claims 56 and 57. Applicants disagree. Although "it is routine in the art to monitor the manufacturing process, whereby temperature, pressure, flow rate of gases, etc[.], are in turn adjusted/varied to meet/maintain specified tolerances[,]" these adjustments are made during the manufacturing process to maintain a constant composition of the deposited layer. Claims 56 and 57 disclose varying the flow rate of at least one of the Si-containing gas or the Ge-containing gas to purposefully provide a variable Si:Ge ratio within the SiGe layer as it is being deposited. This is opposite from making adjustments in flow rates to maintain uniformity within a specified tolerance. Sagnes discloses a method for depositing a SiGe layer of uniform composition, and teaches away from purposefully depositing a SiGe layer of variable composition

with respect to the Si:Ge ratio. Because Sagnes teaches away from a SiGe layer having a variable Si:Ge ratio, Sagnes does not implicitly disclose adjusting the flow rate of at least one of the Si-containing or the Ge-containing gas to purposefully obtain a SiGe layer of variable Si:Ge ratio as it is being deposited. Applicants therefore respectfully request that the rejection of claim 56 and it dependent claim 57 under § 102(b) over Sagnes be withdrawn.

With respect to the rejection of Claims 54 and 5 under § 103(a) over Sagnes in view of Uejima et al., Applicants respectfully traverse for at least the same reasons provided with respect to the rejection of claim 1 over Sagnes. In addition, col. 6, lines 34-50 of Sagnes disclose that it is desirable to deposit SiGe layers having uniform composition. Where the prior art teaches against the claimed invention, the rejection cannot stand. The Uejima et al. article does not cure the deficiency of Sagnes. Specifically, Uejima et al. do not teach or suggest depositing a graded Si_xGe_{1-x} layer over the dielectric layer so as to have a graded, variable Si:Ge ratio over the thickness thereof. The Uejima et al. article discloses fabricating a number of different structures, each deposited to have a SiGe layer with a constant Ge mole fraction. The SiGe layer is then subjected to S/D annealing. SIMS analysis reveals Ge diffusion into the poly-Si layer and into the a-Si layer after annealing. This diffusion of Ge necessarily creates a variation in the composition of the SiGe layer with respect to the Si:Ge ratio. However, the variable composition is not provided by the deposition step itself. In contrast to the method disclosed by Uejima et al., the present invention reduces poly-depletion, i.e., Ge diffusion at the interfaces, by depositing the variable composition SiGe layer. It is further noted that the S/D annealing step in Uejima occurs

after forming the Si cap layer. Because the SiGe layer was not deposited as a variable composition layer in Uejima et al., the Ge diffusion or poly-depletion occurs at the interfaces. The present invention therefore addresses the very problem that is shown to exist by Uejima et al. Applicants therefore respectfully request that the rejection of claim 54 and its dependent claim 5 under § 103(a) over Sagnes in view of Uejima et al. be withdrawn.

With respect to the rejection of claim 8 under § 103(a) over Sagnes in view of Uejima, Applicants respectfully traverse for at least the same reasons provided with respect to the rejection of claim 1 over Sagnes and for at least the same reasons provided with respect to the rejection of claims 54 and 5 over Sagnes in view of Uejima et al. Neither Sagnes or Uejima teach or suggest depositing the SiGe layer so as to have a graded, variable Si:Ge layer with the Ge contents claimed. Rather, both Sagnes and Uejima disclose depositing layers of uniform Ge content, and Uejima only discloses that variable composition be achieved through post-deposition annealing. Thus, Uejima can only suggest modification of Sagnes to anneal the SiGe layer of Sagnes, which does not amount to a teaching/suggestion of the claimed invention. Applicants therefore respectfully request that the rejection of claim 8 under § 103(a) over Sagnes in view of Uejima et al. be withdrawn.

In view of the foregoing amendments to the claims and remarks given herein, Applicants respectfully believe this case is in condition for allowance and respectfully request allowance of the pending claims. If the Examiner believes any detailed language of the claims requires further discussion, the Examiner is respectfully asked to telephone the undersigned

attorney so that the matter may be promptly resolved. The Examiner's prompt attention to this matter is appreciated.

Applicants are of the opinion that no additional fee is due as a result of this amendment. If any charges or credits are necessary to complete this communication, please apply them to Deposit Account No. 23-3000.

Respectfully submitted,

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